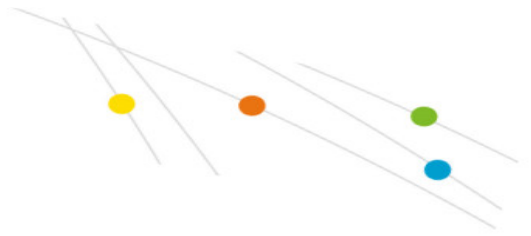


Use of Qrop® K in Ecuador prevented leaf drop due to Black Sigatoka and increased banana yield by 33%

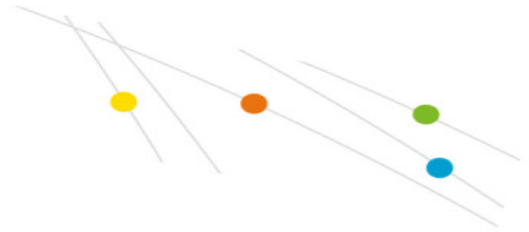
Replacing KCl by Qrop® K as main source of potassium in the farmers practice in Ecuador, resulted in 33% higher yield and revenue from bananas. The higher productivity of the crop was attributed to a significantly higher retention of leaves with Qrop® K in presence of Black Sigatoka in the plantation.

The higher total yield was achieved with the same amount of N and K<sub>2</sub>O applied per ha. Higher quality of yield was reflected in a significantly higher bunch weight and numbers of hands/bunch and boxes/bunch.

Black Sigatoka (*Mycosphaerella fijiensis*) is a fungal disease representing a serious threat for banana production globally. The fast growing banana crop has a high need for potassium, an important nutrient to support plant resistance to fungal attack. Banana plants provided with optimal potassium nutrition can overcome damage caused by Black Sigatoka. Unfortunately, growers still choose to use potassium chloride as the main, but not optimal, potassium source. Dr. Carmen Suárez and Dr. Ignacio Sotomayor of the Technical University in Quevedo, Ecuador supervised a study initiated by SQM country managers Eng. Antonio Cabezón and Eng. Diego Monteros. The research aimed to show the benefits of the preferred potassium source - potassium nitrate in Qrop® K - for increasing plant resilience to Black Sigatoka.





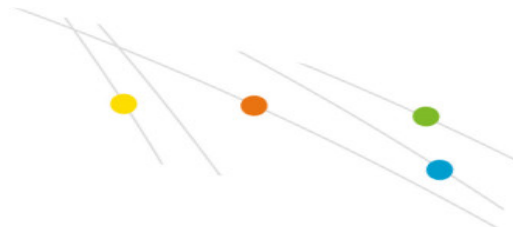


*Image 1. Individual suckers were marked at the start of the trial to ensure that a homogenous set of plant was evaluated in all tratments.*



*Image 2. Assessment of the number of leaves.*

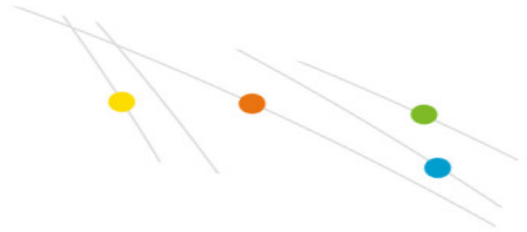
The trial was performed from January till August in the province of Los Ríos-Ecuador, in collaboration with the technical state-university of Quevedo. Treatments and observations were executed in three replicates of 7 plants each, in a completely



randomized design on new suckers measuring 1,3 - 1,5 m at the start of the trial. Farmers practice included potassium chloride as sole K source, whereas all K was supplied with potassium nitrate in the Qrop<sup>®</sup> K-based programmes. Two SQM programmes were tested, providing either equal or 1,5 times the N and K<sub>2</sub>O supply of the farmers practice (351 kg N/ha; 576 kg K<sub>2</sub>O/ha) (Table 1). All fertilisers were applied in 11 split applications during the trial period.

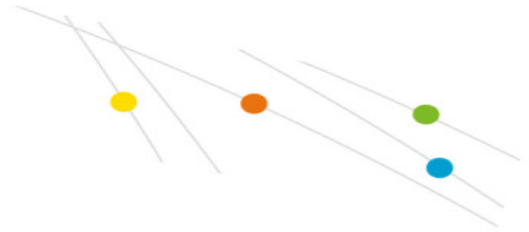
*Table 1. Fertiliser programmes applied in the trial. The total amount of fertilisers was split over 11 applications in 8 months (one application every three weeks). This programme does not contain the fertilisers applied in the period before the trial (with plants less than 1,30 m. high). P is applied only in these earlier vegetative stages.*

Fertiliser source Fuente de fertilizante	Farmers Practice Práctica habitual del agricultor					Qrop <sup>®</sup> K 1					Qrop <sup>®</sup> K 1,5				
	(kg/ha)					(kg/ha)					(kg/ha)				
Qrop <sup>®</sup> K (13-0-45)						1275					1872				
Ammonium Nitrate Nitrato de Amonio	638					544					884				
Magnesium Sulphate Sulfato de Magnesio	255					340					340				
Nitromag <sup>®</sup> (21-0-0-11Ca-7,5Mg)	638														
KCl	961														
<b>Total Fertilisers Total de Fertilizantes</b>	<b>2491</b>					<b>2159</b>					<b>3096</b>				
Total nutrients Total de nutrientes	N-Total	N-NO <sub>3</sub>	N-NH <sub>4</sub>	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	N-Total	N-NO <sub>3</sub>	N-NH <sub>4</sub>	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O	N-Total	N-NO <sub>3</sub>	N-NH <sub>4</sub>	P <sub>2</sub> O <sub>5</sub>	K <sub>2</sub> O
	351	177	174	0	576	350	258	92	0	574	544	394	150	0	842
	MgO	SO <sub>4</sub>	CaO	Cl		MgO	SO <sub>4</sub>	CaO	Cl		MgO	SO <sub>4</sub>	CaO	Cl	
	112	51	70	432		85	68	0	0		85	68	0	0	



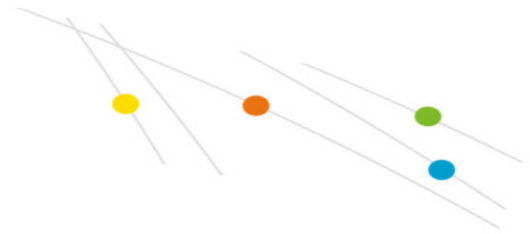
*Image 3. A bunch harvested from a Qrop® K treated plot.*





*Image 4. Determination of export quality yield per bunch.*

Banana plants fertilised with Qrop<sup>®</sup> K as only K source, retained 20% more leaves at harvest compared to the farmers practice. This was mainly attributed to the increased resilience of the plants to prevailing Black Sigatoka infestation. By retaining a higher level of photosynthetic potential, the plants were able to produce larger and heavier bunches, more boxes/bunch (at 20 kg/box) and filling 33% more boxes per bunch



(Table 2).

Increasing the total N and K<sub>2</sub>O dose with the Qrop<sup>®</sup> K based programme did not result in an increase of crop development and yield parameters compared to the lower dose.

Financial analyses of the treatment was performed for the SQM programme that was equivalent to the farmers practice in delivery of N and K<sub>2</sub>O (Table 3). The SQM programme added to the cost of fertilisers, raising the proportional investment in nutrients from 7% to 10% of the total cultivation costs. The 33% higher revenue from 840 extra boxes/ha, more than compensated the higher price of the SQM programme: Break-even point is reached with 3% extra yield (81 boxes/ha).

Table 2. Plant development and yield parametes measured in the course of the trial and at harvest.

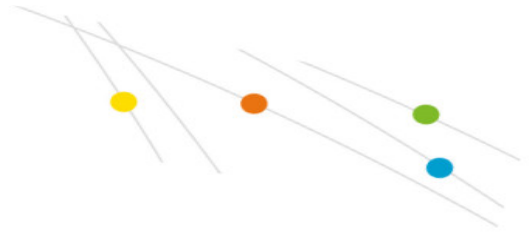
Measurement Mediciones	Farmers Practice Práctica habitual del agricultor	Qrop <sup>®</sup> K 1	Qrop <sup>®</sup> K 1,5
Total developed leaves (number) Total de hojas desarrolladas (números)	27,1	30,3*	29,2
Remaining leaves at harvest time (number) Hojas que quedaban al momento de la cosecha (número)	6,1	7,5*	7,3*
Pseudostallum diameter (cm) Diametro Pseudotallo (cm)	25,1	26,7	25,8
Bunch weight (kg/bunch) Peso del racimo (kg/racimo)	27,3	32,8*	32,2*
Hands (number/bunch) Manos (número/racimo)	6,6	8,5*	8,0*
Boxes/bunch (number) Cajas/racimo (número)	1,2	1,6*	1,6*

Image not found or type unknown

Table 3. Financial analyses of the benefit of application of a Qrop

®

K- based fertiliser programme.



	Farmers Practice Práctica habitual del agricultor	Qrop® K 1	Benefit of Qrop® K
Yield (boxes/ha) Rendimiento (cajas/ha)	2520	3360	+840 (33%)
Price (USD/box) Precio (USD/caja)	6,2	6,2	-
Revenue (USD/ha) Ingreso (USD/ha)	15624	20832	+5208 (33%)
Cost fertilisers (USD/ha) Costo de los fertilizantes (USD/ha)	889	1391	-502
Gross Profit (USD/ha) Ingreso bruto (USD/ha)	14735	19441	+4706 (32%)
Break-even point: Yield increase required to justify investment in Qrop® K Punto de equilibrio: se requiere un aumento del rendimiento para justificar la inversión en Qrop® K			
Number of boxes/ha Número de cajas/ha		+81 (3%)	

 Image not found or type unknown